

June 9, 1987

CD-87-07

Dear Manufacturer:

SUBJECT: Proposed Procedure to Ensure Compliance with Regulatory
Requirements for Mileage Accumulation Fuel

Manufacturer letter CD-86-14 (dated June 29, 1986) requested information regarding service accumulation fuel. After reviewing the information manufacturers submitted, we found some cases where mileage accumulation fuels in use do not adequately represent commercial fuels. While the regulations require manufacturers to use mileage accumulation fuel which is representative of commercial fuel, they do not offer any guidance as to how this representativeness should be determined. The Environmental Protection Agency believes such guidance would help all manufacturers of gasoline vehicles and engines understand their regulatory responsibilities under 40 CFR 86.113-82(a)(2), 86.1213-85(b), and 86.1313-84(a)(2).

Enclosed is a draft proposal of our procedure for determining the representativeness of mileage accumulation fuel. To ensure that our approach is clear, accurate, and feasible, we would like to solicit industry comment before the document is finalized. All written comments should be sent to the Certification Policy and Support Branch. Any questions may be addressed to John German (313) 668-4214 or Todd Sherwood (313) 668-4405 of my staff.

Sincerely,

Robert E. Maxwell, Director
Certification Division
Office of Mobile Sources

Enclosure

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DRAFT PROPOSAL

Regulatory Requirements for Mileage Accumulation Fuels

As a followup to our audit of mileage accumulation fuels and lubricants, EPA would like to remind all manufacturers of their regulatory requirement to use fuels for mileage accumulation which represent commercially available fuels. For simplicity, the discussion and examples in this document address only light-duty vehicles and trucks covered under 40 CFR 86.113-82(a)(2) of the regulations. However, although they are not specifically referenced throughout the text, manufacturers should note that these requirements apply equally to gasoline heavy-duty vehicles and heavy-duty engines under 40 CFR 86.1213-85(b) and 86.1313-84(a)(2), respectively.

The requirements discussed in this document apply only to gasoline engines. The regulations governing diesel fuel do not contain the requirement that mileage accumulation fuel have properties representative of available commercial fuel. Instead, fuel property specifications are provided for mileage accumulation fuel used in diesel engines.

The audit, initiated by our manufacturer guidance letter CD-86-14 (LD) of June 25, 1986, requested manufacturers of light-duty vehicles and trucks to submit information regarding the mileage accumulation fuels used to operate their 1987 model year test vehicles. The results of the audit indicate that most manufacturers are complying with the current regulation governing mileage accumulation fuels. However, we have found some cases where manufacturers are using mileage accumulation fuels that inadequately represent commercial fuels. This discovery has prompted us to issue a reminder to all manufacturers.

The most significant problems with mileage accumulation fuels uncovered by our audit concern sulfur, lead, and octane levels. Because of the potential effect of these fuel properties on the representativeness of data vehicles, we are issuing more specific guidelines for determining representative levels of sulfur, lead and octane. Note that this does not mean other

fuel properties may be ignored. At this time, we are not issuing specific guidance for other fuel properties because manufacturers, apparently, are currently using adequate procedures to ensure their mileage accumulation fuels sufficiently represent commercial fuels. However, manufacturers are encouraged to use procedures similar to those presented here for lead, sulfur, and octane in evaluating the representativeness of the other fuel properties in their mileage accumulation fuel. Of course, the need for additional guidance from EPA may be reassessed based upon future audit results.

General Guidelines

To ensure adequate representation of commercial fuels, manufacturers should specify their mileage accumulation fuels such that they contain appropriate levels of fuel properties most critical to vehicle emissions control. EPA will accept the average commercial fuel property levels from appropriate fuel surveys as baselines in determining mileage accumulation fuel property levels. The actual technique for determining mileage accumulation fuel property levels will result in acceptable measured levels slightly higher or lower than the commercial fuel baselines, as discussed in the next section. Two examples of appropriate, nationwide, fuel surveys are those conducted by the Motor Vehicle Manufacturers Association (MVMA) and the National Institute for Petroleum and Energy Research (NIPER). These particular surveys are conducted twice yearly during both the winter and the summer seasons.

Manufacturers should use the most recent survey information available. However, EPA does not perceive a need to update mileage accumulation fuel more than once a year. In all cases, excluding RVP (as discussed in the following paragraph), EPA will accept the most recent summer survey as sufficiently up to date. Manufacturers may, on a continuing basis, use up mileage accumulation fuel purchased prior to the receipt of new survey information. However, new fuel purchases should conform to the latest available information.

Manufacturers should note that the regulations treat RVP slightly differently. Section 86.113-82(a)(2)(iv) requires RVP to be characteristic of the motor fuel used during the season in which the mileage accumulation takes place. Therefore, while averages obtained from appropriate fuel surveys during the summer season are acceptable baselines for most fuel

properties, averages obtained from surveys taken during the season in which mileage accumulation takes place must be used as the baseline for RVP.

Measurement of Fuel Property Levels

Mileage accumulation fuel property levels should be measured using appropriate ASTM methods or such other methods shown to measure equivalent amounts of these properties. To allow for measurement inaccuracy, ASTM provides reproducibility limits on the results of their measurement methods. The reproducibility limit is defined as the 95 percent confidence interval for two independent measurements done at two different laboratories on identical test samples.

To ensure that mileage accumulation fuels will have true property levels no less than (or greater than) the appropriate commercial fuel average, the procedures described in ASTM D3244, "Utilization of Test Data to Determine Conformance with Specifications," or other procedures which yield equivalent results, should be used. The "Acceptance Limit" is defined in ASTM D3244, for a single result from one laboratory, as:

$$AL = S + 0.255 \times (\text{square root sign})^2 \times R \times D$$

Where S = the specification value

R = the reproducibility limit

D = factor corresponding to desired confidence level.

EPA will accept a 90 percent confidence level as being sufficiently stringent to prevent the possibility of an inappropriate fuel property level meeting the commercial fuel average simply because of measurement inaccuracy. From table I in ASTM D3244, D = 1.282 for a minimum specification limit at the 90 percent confidence level and -1.282 for a maximum specification limit. Therefore:

$$AL = S + 0.462 R$$

Examples of how the ASTM reproducibility limits impact the acceptability of mileage accumulation fuels are presented, below, for the procedures commonly used to measure sulfur, lead, and octane.

In certain cases, the reproducibility limit of the measurement

method used could be greater than the nationwide commercial fuel average. In such cases, EPA will accept the substitution of the commercial fuel average for the value of R, instead of the reproducibility limit, as being a sufficiently representative method of determining the appropriate measured mileage

accumulation fuel property level (i.e., the minimum fuel property level would be equal to 1.462 times the commercial fuel average). However, should the possibility of a "false" measurement exist (i.e., there is a chance the measurement method may return a positive reading for a fuel property which is not actually present in the fuel), manufacturers should analyze multiple samples as necessary to confirm the fuel property level of the mileage accumulation fuel.

Example Calculations for Sulfur, Lead, and Octane

The most recent summer fuel survey done by MVMA sampled fuel sold during the summer of 1986. The results of this survey conformed very closely with the 1985 MVMA summer survey results. The most recent NIPER survey available to us sampled fuels sold during the summer of 1985. These surveys show the average levels of sulfur, lead, and octane in unleaded regular grade commercial fuels nationwide to be as follows:

Property	Measurement Method	Average Measured Level
Sulfur (% wt)	ASTM D1266	0.032
Lead (g/U.S. gal)	ASTM D3237	0.002
Octane (RON)	ASTM D2699	92.0

As discussed above, to ensure that a manufacturer's mileage accumulation fuel actually contains the above levels of sulfur, lead, and octane, the reproducibility of the measurement method needs to be considered. For example, ASTM D1266 has a reproducibility limit of $.01 + 2.5 \text{ percent}$. If this method is used to measure the sulfur in mileage accumulation fuel, then a minimum level of $S + [.01 + .025(S)] (.462)$ (where S is the average sulfur content, percent weight, of commercial fuels) must be measured to ensure the fuel actually contains at least the average commercial fuel average. For $S = .032$ (percent weight), this works out to a minimum measured level of $.037$ (percent weight). Using lead as another example and assuming ASTM D3237 is used, the reproducibility limit would be $.01$ (g/U.S. gallons). However, as this is greater than the average

commercial fuel level, a minimum measured level of 1.462 times the average commercial fuel level, or .003 g/U.S. gallon, would be considered acceptable. Octane is straightforward, with .462 times the reproducibility limit of .65 RON (assuming ASTM D2699 is used) subtracted from the 1985 summer survey commercial fuel average of 92 RON to establish a maximum measured octane level of 91.7 RON. These results may be summarized as follows:

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Property	Method	Reproducibility Limit	MA Fuel Property Limit
Sulfur (% wt)	ASTM D1266	.01 + 2.5%	.037 (min)
Lead (g/U.S. gal)	ASTM D3237	.01	.003 (min)
Octane (RON)	ASTM D2699	.65	91.7 (max)

Of course, the above limits would be modified as dictated by subsequent survey results. Also, please note the regulations place additional restrictions upon octane. Mileage accumulation fuel must have a minimum sensitivity (RON minus MON) of 7.5 octane numbers and the measured octane rating of the mileage accumulation fuel may not be higher than one octane number above the minimum recommended by the manufacturer.

Premium Fuel

Manufacturers may use premium unleaded average commercial octane levels to determine the representativeness of their mileage accumulation fuel for their vehicles in which they recommend premium fuel for general use. Manufacturers should note that premium fuel may be used for mileage accumulation only if it is clearly stated in all appropriate customer information that premium fuel is recommended for all driving conditions. If, for example, premium fuel is recommended for maximum performance or operation at high altitudes, then the implicit understanding is that regular fuel is recommended for use in other driving conditions. In a case such as this, the "minimum recommended" octane would be regular unleaded fuel and thus, under 40 CFR 86.113-82(a)(2)(iii), the manufacturer must base their mileage accumulation fuel acceptability on comparison to regular unleaded commercial octane averages.

Vehicles equipped with a switch which allows the driver to select between two or more octane positions should accumulate mileage using regular unleaded fuel with the switch in the lowest octane position. This is consistent with the requirement of 40 CFR 86.113-82(a)(2)(iii) that the measured octane rating of mileage accumulation fuel cannot be more than one octane number above the minimum recommended by the manufacturer. The

presence of a driver-selectable switch position would constitute such a recommendation. The only exception to this is if the vehicle will experience significant driveability problems if operated in the low octane position with regular fuel. Such a design might be incorporated in the vehicle, for example, for emergency use.

Other Considerations

All manufacturers should continue to monitor the MVMA and the NIPER fuel survey results on a regular basis so they can revise their mileage accumulation fuels to reflect any changes in commercial fuel properties. For carryover data, the suitability of the mileage accumulation fuel will be based upon the most up-to-date survey information available to the manufacturer at the time the vehicle used to generate the carryover data accumulated mileage. EPA does not intend to prohibit carryover solely due to a change in fuel property levels of commercial fuel.

Manufacturers should consult their certification team if they wish to follow procedures different from those described above.

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